



**Environmental Management Services Company**  
1413 West 57th Street  
Loveland, CO 80538  
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November 4, 1999

Mr. Dennis Frederick  
Division of Water Quality  
288 North 1460 West  
Salt Lake, City, UT 84114

Mr. D. Wayne Hedberg  
Division of Oil, Gas and Mining  
1594 West North Temple, Suite 1210  
Salt Lake City, Utah, 84114

Re: Tintic Dry Stack Tailings Pre-Design Meeting

Dear Dennis and Wayne;

Enclosed please find two copies of the Project Introduction to the Tintic Dry Stack Tailings Project prepared as background to our pre-design meeting scheduled to be held at 10 a.m. Wednesday November 10, 1999. Thank you for scheduling this meeting on short notice and we look forward to discussing the project with your two groups.

Sincerely,

A handwritten signature in black ink, appearing to read "Tom".

Thomas E. Gast  
Principal

Encl.

Cc. Paul Spor and Greg Smith, Tintic Utah Metals, LLC  
Ed Schneider and Deb Miller, ESA Consultants Inc.

**TINTIC DRY STACK TAILINGS PRE-DESIGN MEETING**  
**Project Introduction**

**Utah Division of Water Quality  
Utah Division of Oil, Gas and Mining**

**10 a.m. Wednesday November 10, 1999  
1594 West North Temple, Room 2130  
Salt Lake City, Utah 84114**

**Project Proponent:  
Tintic Utah Metals, LLC  
15988 Silver Pass Road  
Eureka, Utah, 84628  
Paul Spor, Executive Director  
435 / 433-6606**

**November 1, 1999**

**TINTIC DRY STACK TAILINGS PRE-DESIGN MEETING  
UTAH DWQ/DOGM**

**Proponents Representatives**

Paul Spor, Executive Director  
Greg Smith, Mill Superintendent  
Tintic Utah Metals, LLC  
PO Box 51  
15988 Silver Pass Road  
Eureka, UT 84628  
Voice 435 / 433-6606  
Fax 435 / 433 - 6606

Ed Schneider, P.G., Hydrogeologist  
Debora Miller, P.E., Ph.D., Geotechnical Engineer  
ESA Consultants Inc.  
2637 Midpoint Drive  
Suite F  
Fort Collins, CO 80525  
Voice 970 / 484-3611  
Fax 970 / 484-4118

Tom Gast, Principal  
Environmental Management Services Company  
1413 West 57<sup>th</sup> Street  
Loveland, CO 80538  
Voice 970 / 461-0571  
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## **Presentation Outline**

**1.0 Introductions (Tom Gast)**

**2.0 Project History and Status (Paul Spor)**

**3.0 Mill Flow Sheet (Greg Smith)**

**4.0 Dry Stack Facility Introduction (Tom Gast)**

**5.0 Design Considerations and Site Characteristics (Ed Schneider)**

**6.0 Dry Stack Facility Conceptual Design (Deb Miller)**

**7.0 Monitoring and Closure (Tom Gast)**

**8.0 Summary (Tom Gast)**

**9.0 Comments, Questions and Answers**

## Introduction

The Tintic Mill is located in the East Tintic Mining District, Utah County, Utah (Exhibit A). In 1984 the property was the subject of an approved Mining and Reclamation Plan filed with DOGM (File Number ACT/049/009) by the property's lessee. Chief Consolidated Mining Company took control of its property in 1993 and continued the property's exploration program. Chief and its partners formed a new company in 1996 for the purpose of returning the property to production. The new company, Tintic Utah Metals, LLC, has prepared a request to transfer the current Mining and Reclamation Permit to Tintic Utah Metals LLC. Upon approval of the transfer, Tintic Utah Metals LLC will assume all reclamation responsibility for the property.

Because of changes to the mining plan resulting from Tintic Utah Metals, LLC current feasibility studies and delays in agency approval of the proposed dewatering plan for one of its mines in the district, the LLC has decided that immediate production could best be gained from known ore bodies above the water table. Therefore the DOGM permit transfer will be modified to reflect this change in mining plans and application will be made to DWQ to allow construction of the dry stack tailings disposal system. The purpose of the November 10, 1999 joint meeting with DWQ and DOGM is to discuss the conceptual dry stack tailings disposal system.

Initial production will come from the existing permitted Trixie and Apex No. 2 mines. Precious metal bearing ore will be mined by conventional underground methods, hoisted to the surface and placed into a loading bin. The ore will be truck hauled from the mines and placed in a surge pile at the concentrator. From the surge pile, the ore will be conveyed to the crushing plant, which includes a primary jaw crusher and a secondary cone crusher along with screen decks. While the ore will be moist, water spray bars will be used to control dust as necessary. Necessary air permits will be filed in November 1999 for the crushing circuit. Crushed ore will be conveyed to the two existing 750-ton fine ore storage bins. Fine ore will be conveyed to the 10-foot by 66-inch ball mill for wet grinding at a rate of 16 tons per hour (384 tons per day, 135,000 tons per year). After grinding, the slurry will be pumped to the gravity circuit and then the flotation plant where various flotation chemicals will be added and the finely ground pulp will be circulated through a series of flotation cells, thickeners and filters. Gold and silver will be produced and shipped for final processing.

The existing concentrator, including crushing and grinding circuits, was commissioned in 1967 and it operated until 1978. Tintic Utah Metals, LLC is in the process of completely renovating the concentrator. Necessary maintenance to the building has been completed or contracted. The crushing and grinding circuits have been rebuilt. A new gravity circuit has been ordered and it will be installed as soon as it is delivered. The old flotation equipment has been removed and modern equipment will be installed.

Tailings will be routed to a thickener and reagents added to improve settling. From the thickener, the tailings will be pumped to a filter where the moisture content will be

reduced to between 15 and 20 percent. Recovered solutions will recycle to the processing circuit and the dry tailings will be conveyed to a loading area. The dry tailings will be loaded into dump trucks and hauled approximately  $\frac{1}{2}$  mile to the proposed dry stack tailing facility. The location of the dry stack facility is shown on Exhibit B. Also shown on this exhibit is the land ownership boundary. Shown on Exhibit C are the facility's watershed boundary and a one-mile radius from the facility. Exhibit D is a 1996 USGS aerial photo of the facility area.

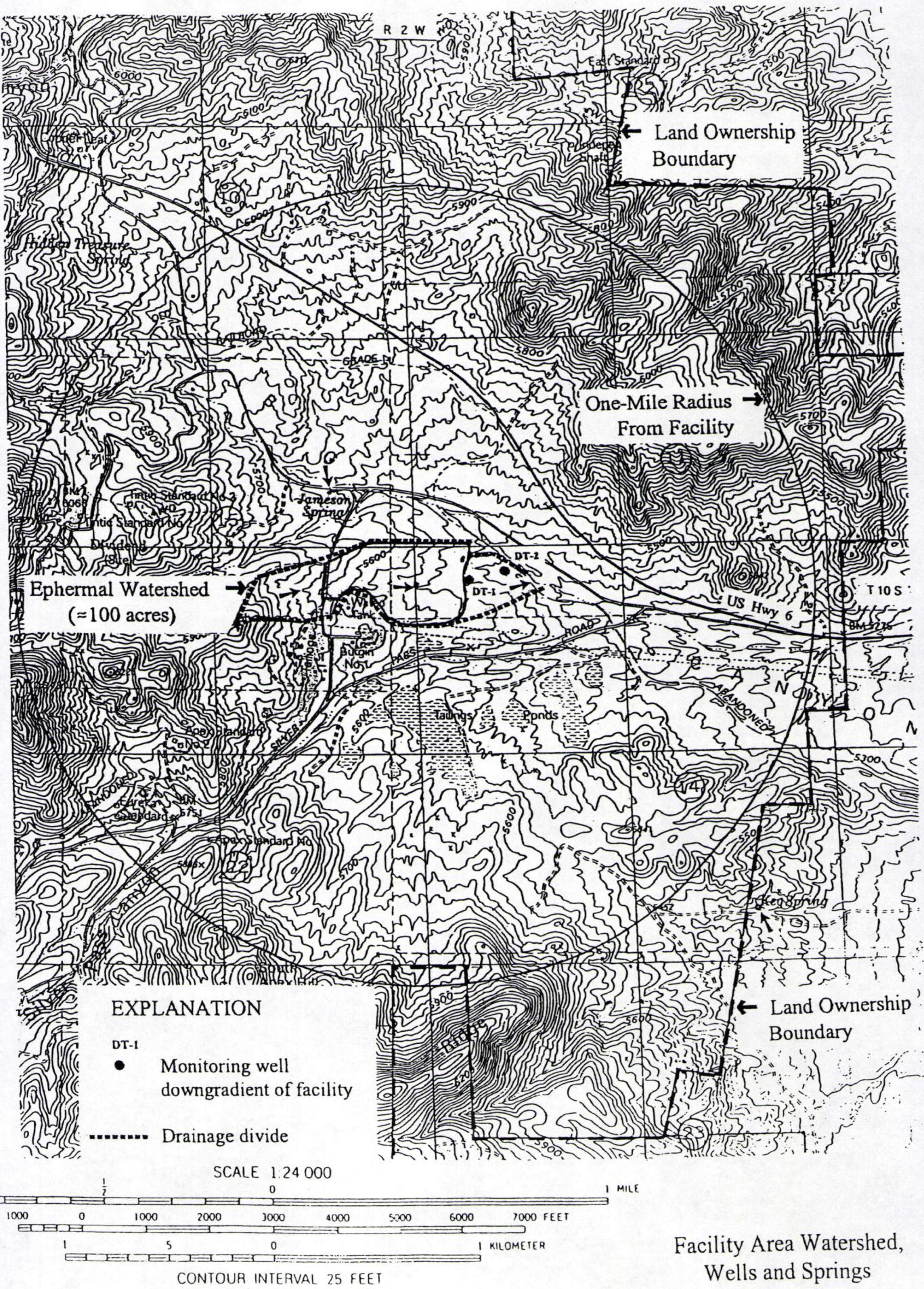
Contrasted with conventional tailings disposal in a tailings pond, dry stacked tailings are unsaturated and disposed of in an engineered waste pile. Consequently, from a ground water protection perspective, DWQ's mine waste pile requirements are appropriate rather than those directed toward tailings ponds or lagoons.

Initial construction activities at the dry stack facility will include removal of vegetation, stockpiling topsoil, and construction of the surface water diversion, sediment control pond and toe buttress. Filtered tailings will be delivered to the facility by truck and the dry stack pile will be constructed using loaders and a radial stacker. As shown on the dry stack facility conceptual drawings, the pile will be built from the toe buttress upslope. Building the pile sequentially will minimize disturbance, and topsoil stripped in years two through five will be directly placed on the completed portions of the pile. Concurrent reclamation activities will include soil placement, fertilization and seeding on an annual basis.

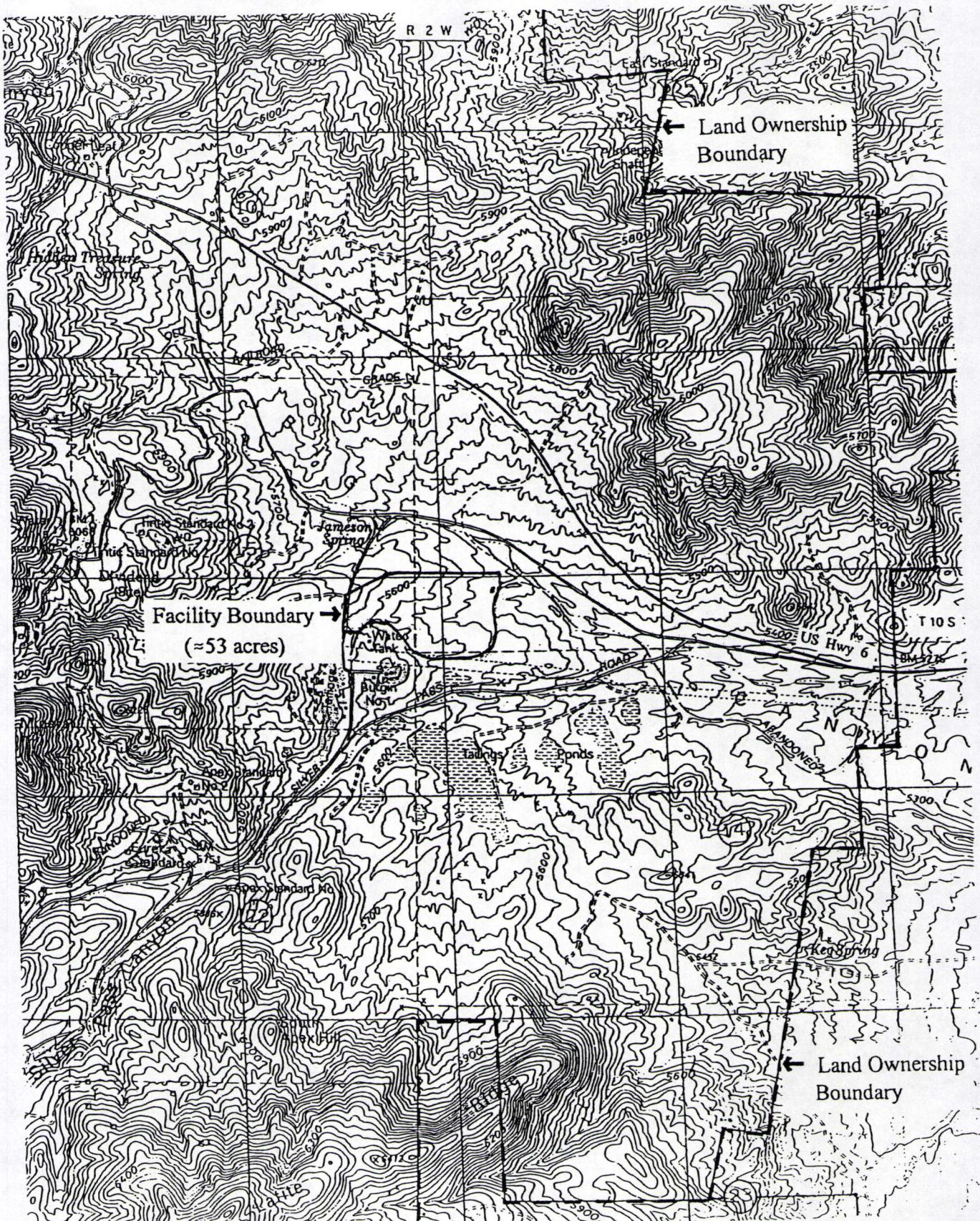
The facility's site characterization including topography, soils, climate, geology, hydrology, surface and ground water, and design considerations will be discussed during the presentation. Finally to be discussed is the facility's conceptual design and expected performance as supported by appropriate modeling.

**Assumptions and Parameters used to Estimate Tailing Mass and Volume**

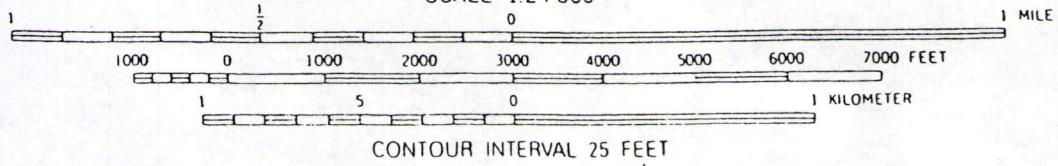
Assumptions	Resulting Parameters
<b>Mine Operating Assumptions</b> 672,000 tons ore produced over life of mine 350 days operation per year ore specific gravity = 2.64	384 tons ore per day 134,440 tons ore per year
<b>Mill Operating Assumptions</b> 604,800 tons tailing produced over life of mine 350 days operation per year	346 tons tailing per day 120,960 tons tailing per year
<b>Properties on Tailing Placed in Dry Stack Facility</b> placement density = approx. $90\% \gamma_{d(max)}$ (Std. Proctor) placement water content = 20% (mass H <sub>2</sub> O/total mass) specific gravity tailing solids = 2.66	$\gamma_d = 92 \text{pcf}$ $w = 25\%$ (mass H <sub>2</sub> O/mass solids)



Facility Area Watershed,  
Wells and Springs



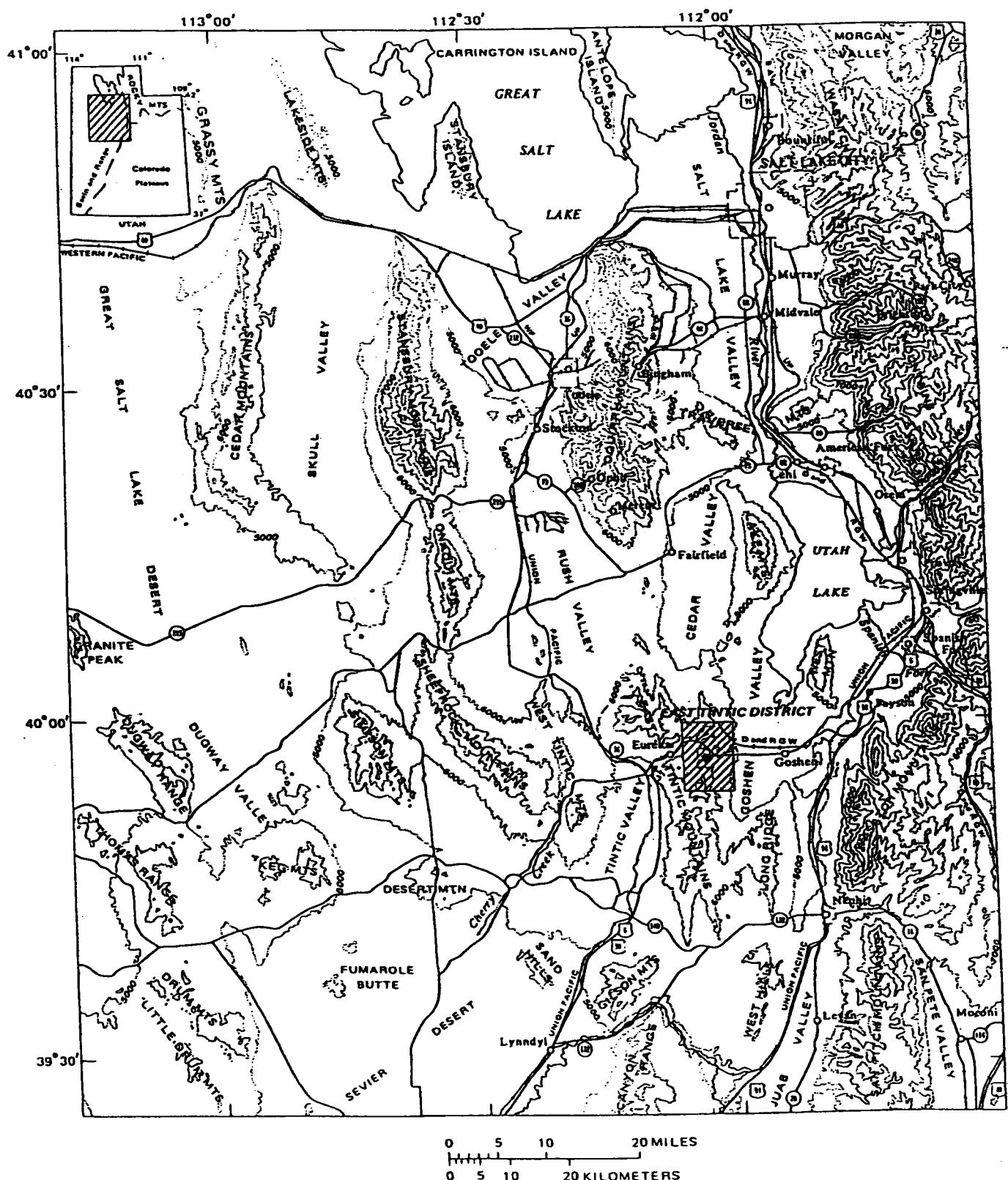
SCALE 1:24 000



CONTOUR INTERVAL 25 FEET

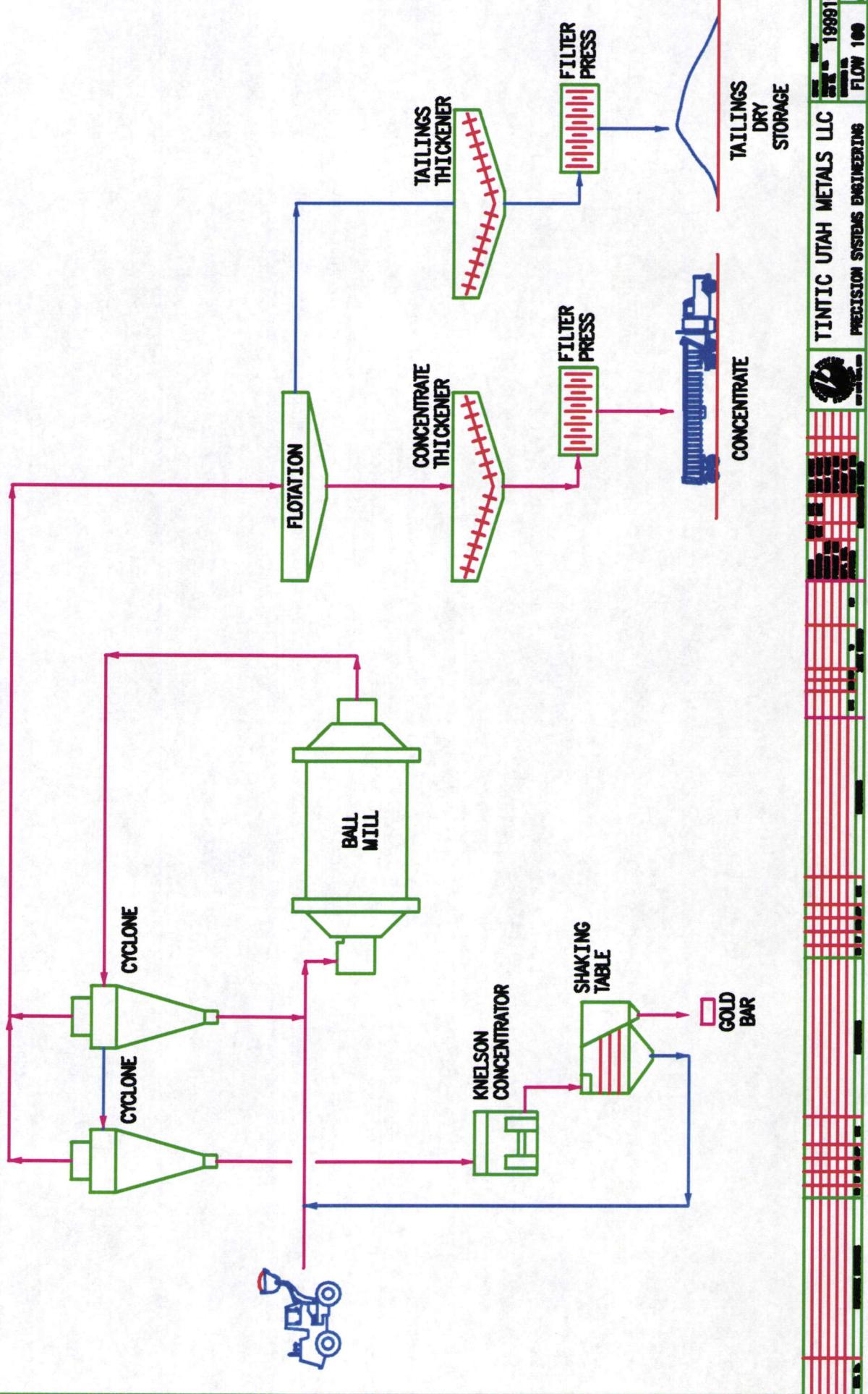
Facility Area  
and  
Land Ownership Map

Exhibit B



Facility Location Map  
East Tintic Mining District

Exhibit A



# BORING/WELL COMPLETION LOG

ESA Consultants

PROJECT: Tintic Dry Stack Tailings Face PAGE: 1  
 PROJECT NO.: 024.9801.023 DATE: 7/22/99  
 CLIENT: Tintic, Utah metals L.L.C.  
 LOCATION: Drainage below tailings site; below RR grade culvert  
 DATE DRILLED: 7/22 DATE COMPLETED: 7/27 SURFACE ELEVATION: 5495  
 BORING DEPTH (FT): 14.4' WELL DEPTH (FT): 7.5 BOREHOLE DIA. (IN): 8"  
 WATER LEVEL (FT): INIT. Dry 24-HOURS:  COMPLETION: Dry  
 CASING: DIA. (IN) 2 LENGTH (FT): 5 TYPE: PVC  
 SCREEN: DIA. (IN) 2 LENGTH (FT): 5 SLOT SIZE (IN): 0.02 DEPTH (FT): 7.5'  
 DRILLING COMPANY: AGEC DRILLING METHOD: Hollow Stem Auger  
 DRILLER: DALE STOTT CME 750 DATUM: Topo Base Map  
 LOGGED BY: E. J. Schneider CHECKED BY:

DEPTH	CLASS.	FIELD DESCRIPTION	WELL LOG	REMARKS
		ALLUVIUM 0-7.5'		
5	IS SW ML SW GP	Topsoil - SILT, sandy (v.f.g.) 0.5-3.5 SAND, F-Lg., silty, calcareous, S. moist, H. gray brown, loose 3.5-5.0' SILT, sandy and clayey, calcareous, moist, brown	+3' 0 -2' -7.0'	Start c 10:00 SPT 2'-2.5 3/3/3 4.0-5.5 SPT 3/3/3 10:10 9.0'-9.4' SPT 50 for 5" 10:20 14.0-14.4' SPT 50 for 4.5" 10:35
10	▲ ▲ ▲ ▲ ▼ ▼	5.0-7.5' SAND & GRAVEL, F.g. -3/8" gravel, H. gray bn, calcareous moist.	-7.0'	Filter Sand, 8-12'; 2"-7.5' Hole Plug 7.5'-9' bentonite chip seal
15		BEDROCK 7.5'+ 7.5'-14.4' Packard Quartz Lignite, fresh, hard, white gray dry TD 14.4'	TD 14.4'	Fill, (cuttings) 9'-14.4' 2" Top & Bottom caps <u>Protector Casing</u> 4" x 4" x 5' steel w/ locking hinged cap & concrete surface seal Stickup 3'
				SHEET <u>1</u> OF <u>1</u>

**Exhibit D Dry Stack Tailings Area**



**Water Characteristics**  
**East Tintic Geothermal Aquifer**

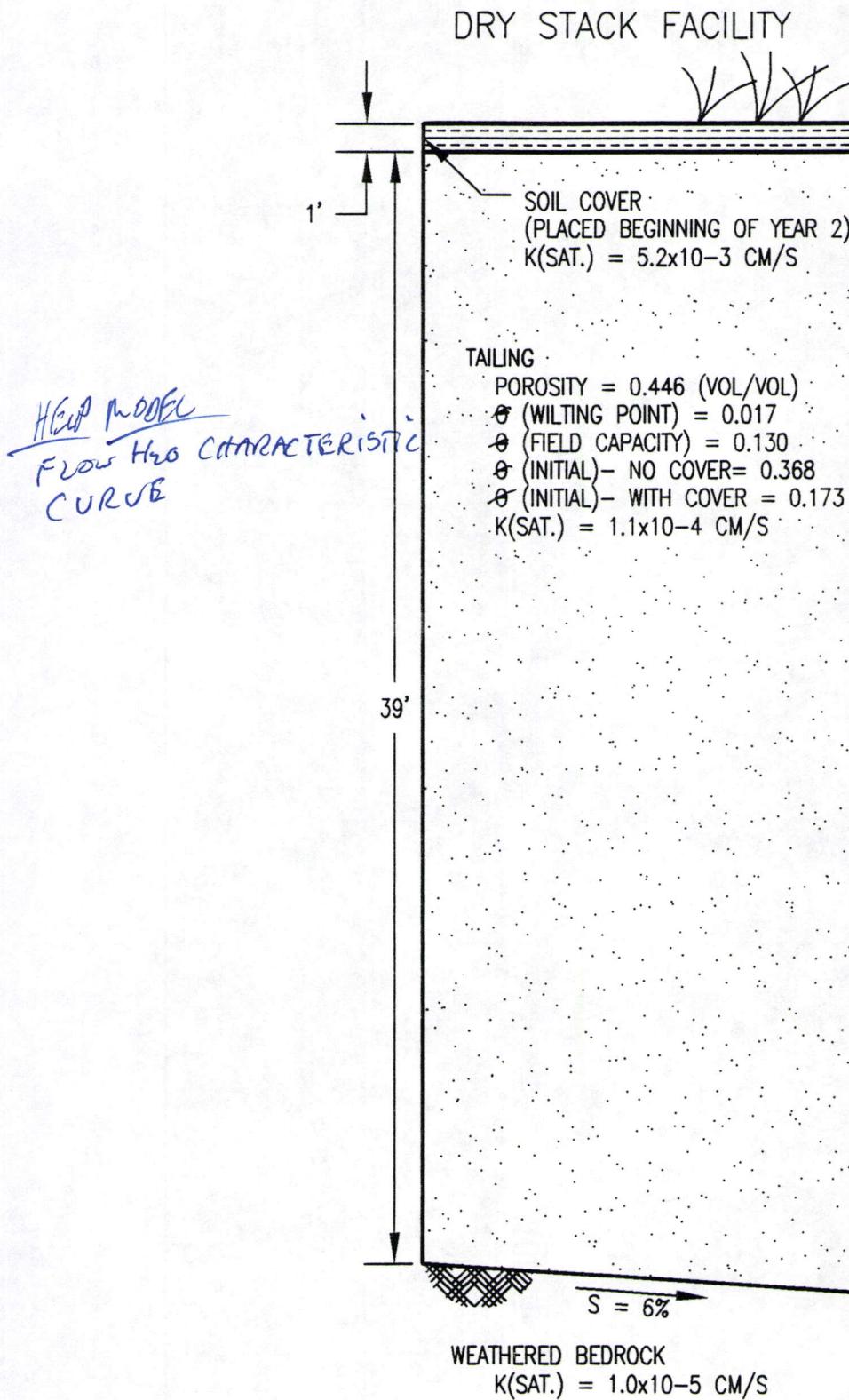
Parameter	Concentrations		
	Low	High	Average
Water Temperature (°F)	130	150	140
Conductivity ( $\mu\text{mhos/cm}$ )	10000	10500	10400
pH (standard units)	6.2	7.5	-
Total Dissolved Solids	6800	7600	7000
Total Suspended Solids	50	700	500
Alkalinity (as $\text{CaCO}_3$ )	100	600	525
Arsenic (As)	0.001	0.5	0.03
Bicarbonate ( $\text{HCO}_3$ )	500	650	600
Boron (B)	3	7	4.5
Calcium (Ca)	150	400	325
Carbon Dioxide ( $\text{CO}_2$ ) (free)	100	500	300
Carbonate ( $\text{CO}_3$ )	0.2	0.4	0.3
Chloride (Cl)	2500	4500	3800
Copper (Cu)	0.01	0.05	0.03
Fluoride (F)	1	4	2
Hardness (as $\text{CaCO}_3$ )	750	2200	1100
Iron (total Fe)	1	10	8
Iron (filtered)	0.15	1	0.5
Lead (Pb)	0	0.3	0.01
Magnesium (Mg)	50	100	70
Manganese (Mn)	1	40	15
Potassium (K)	50	250	150
Silica ( $\text{SiO}_2$ )	20	150	70
Sodium (Na)	700	2500	2200
Sulfate ( $\text{SO}_4$ )	300	1500	400
Zinc (Zn)	0.05	10	0.3

Source: Sunshine Mining Company

Notes: Based on numerous data and samples taken from Burgin mine between 1963 and July 1978. All values in parts per million (ppm) unless otherwise noted.

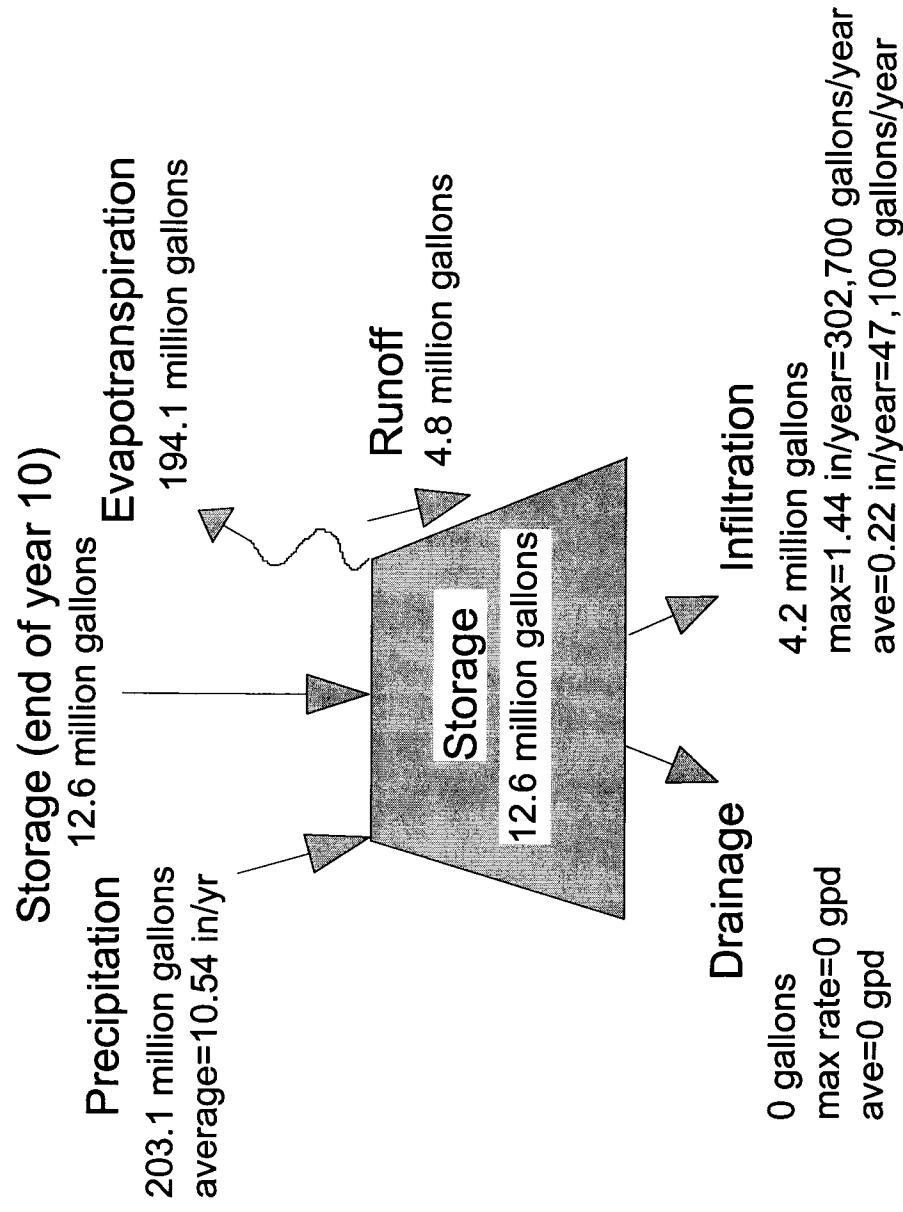
# FIGURE 3.1 TYPICAL STRATIGRAPHIC COLUMN USED IN HELP MODEL

39 FT. COLUMN OF TAILINGS DIRECTLY FROM PROCESSING  
(BLANKET DRAIN BENEATH TOE BUTTRESS).



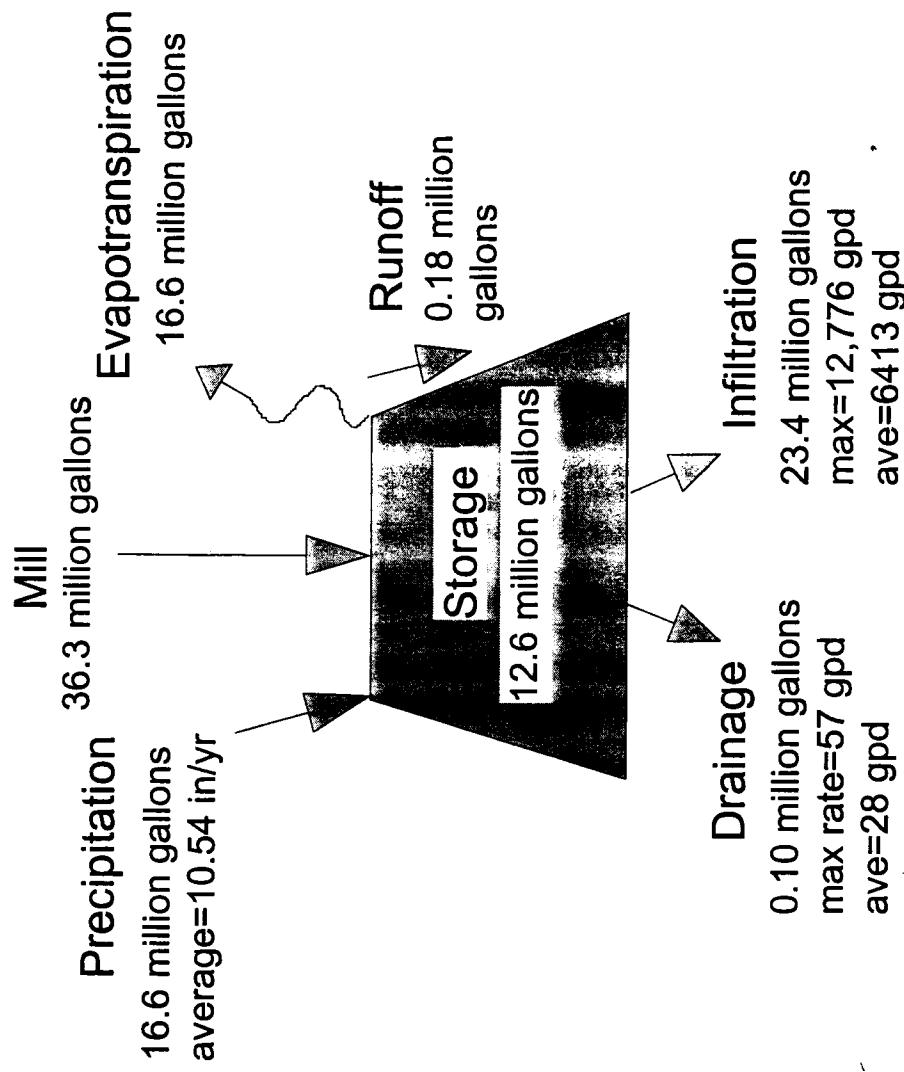
**Figure 3.4(b) Water Balance Flow Chart Years 11-100**  
**Results from HELP model**

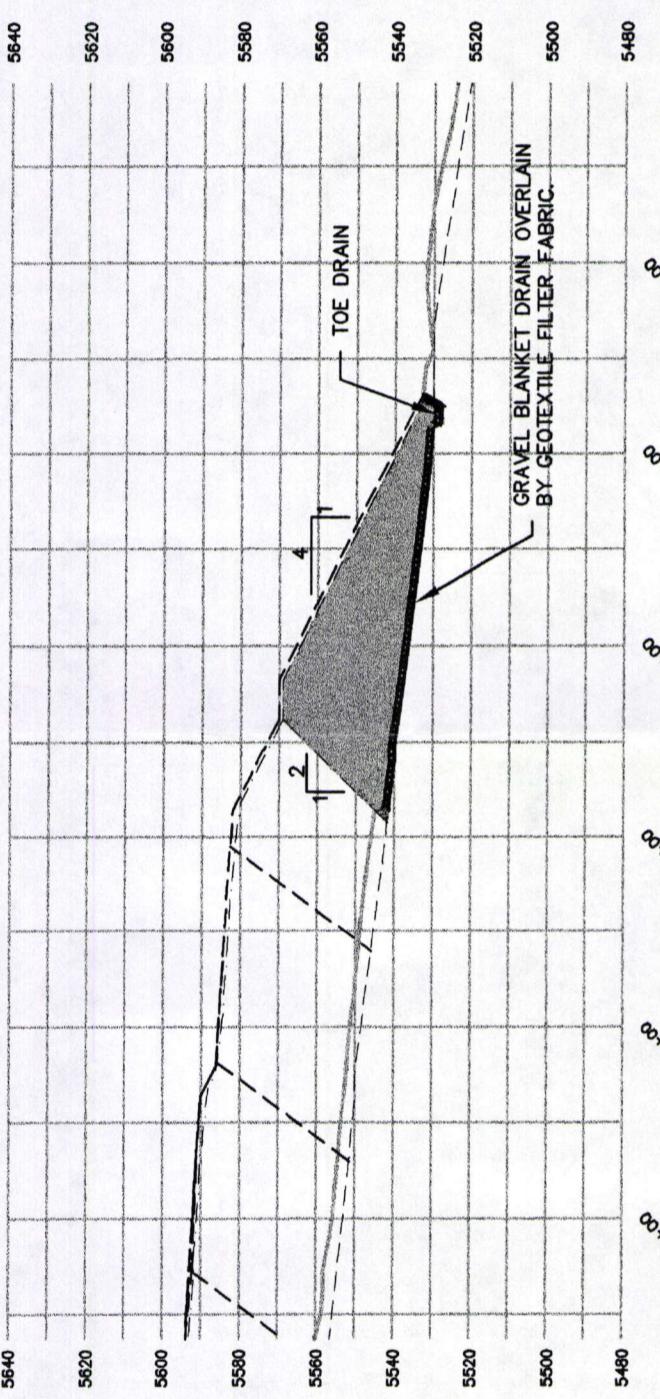
### **Permanent Dry Stack Facility**



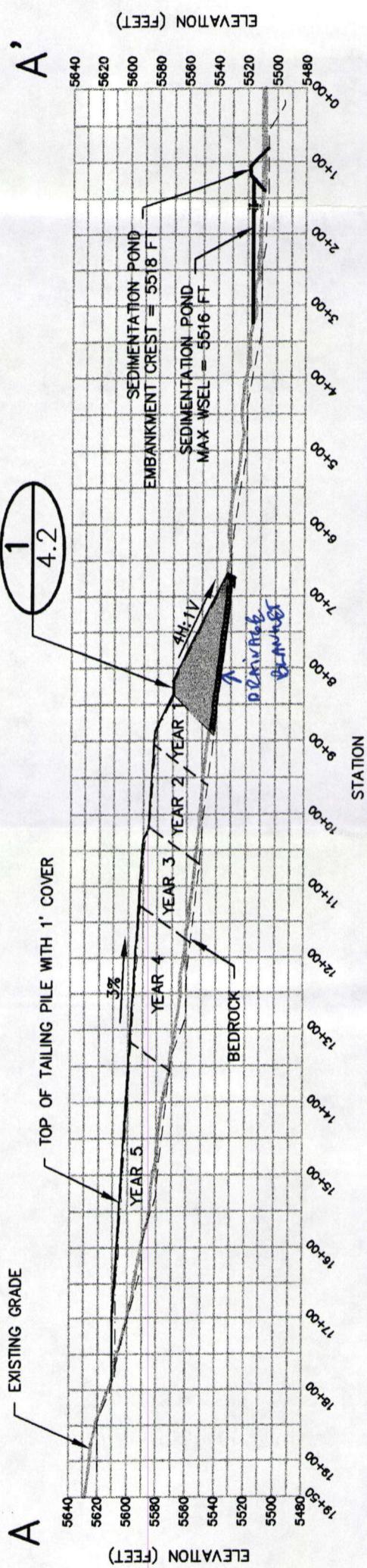
**Figure 3.4(a) Water Balance Flow Chart Years 1-10**  
**Results from HELP model**

### **Permanent Dry Stack Facility**





### 1 TOE BUTTRESS DETAIL

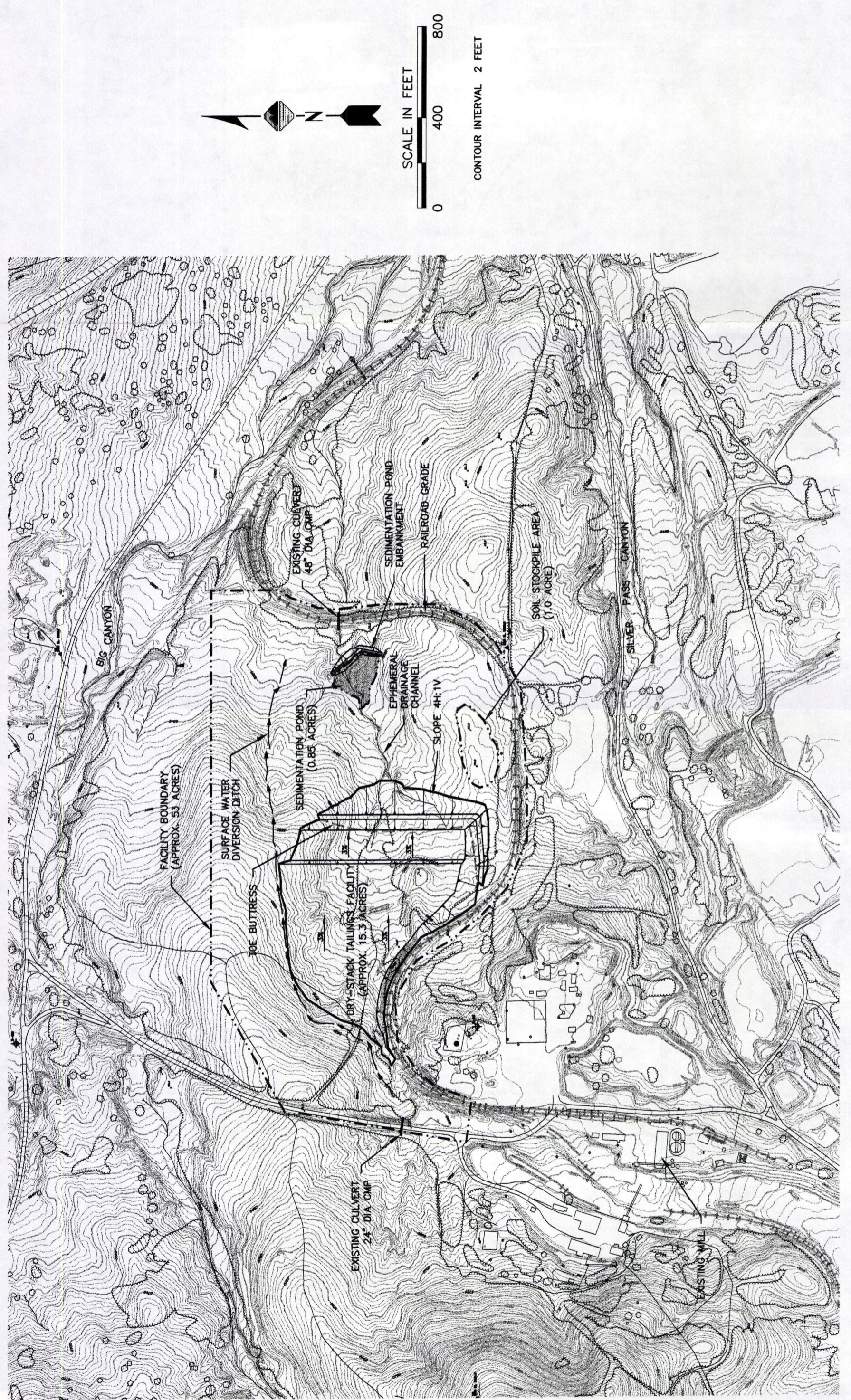


CONCEPTUAL DRY STACK TAILINGS FACILITY PROFILE



CONCEPTUAL DRY STACK TAILINGS FACILITY  
PLAN

PROJECT: 024.9801 DATE: 11/3/99 FIGURE NO: 4.1



CONCEPTUAL DRY STACK TAILINGS FACILITY  
GENERAL SITE MAP

112°00'



Base by U.S. Geological Survey, 7.5  
minute series (topographic), Eureka  
Quadrangle, Utah, 1992.

Water table levels from U.S.  
Geological Survey Professional Paper  
504-F, Plate 4, 1965.

SCALE 1:24 000  
MILE  
KILOMETER

CONTOUR INTERVAL 25 FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1929

**REVIEW COPY**

**EXPLANATION**

- Fault** ——— Fault
- Dashed where inferred or concealed** Dashed where approximately located
- Elevation of water table in mine or drill hole** ● Thermal
- Non-thermal**

## Deep Ground Water Level Map East Tintic Paleozoic Rocks

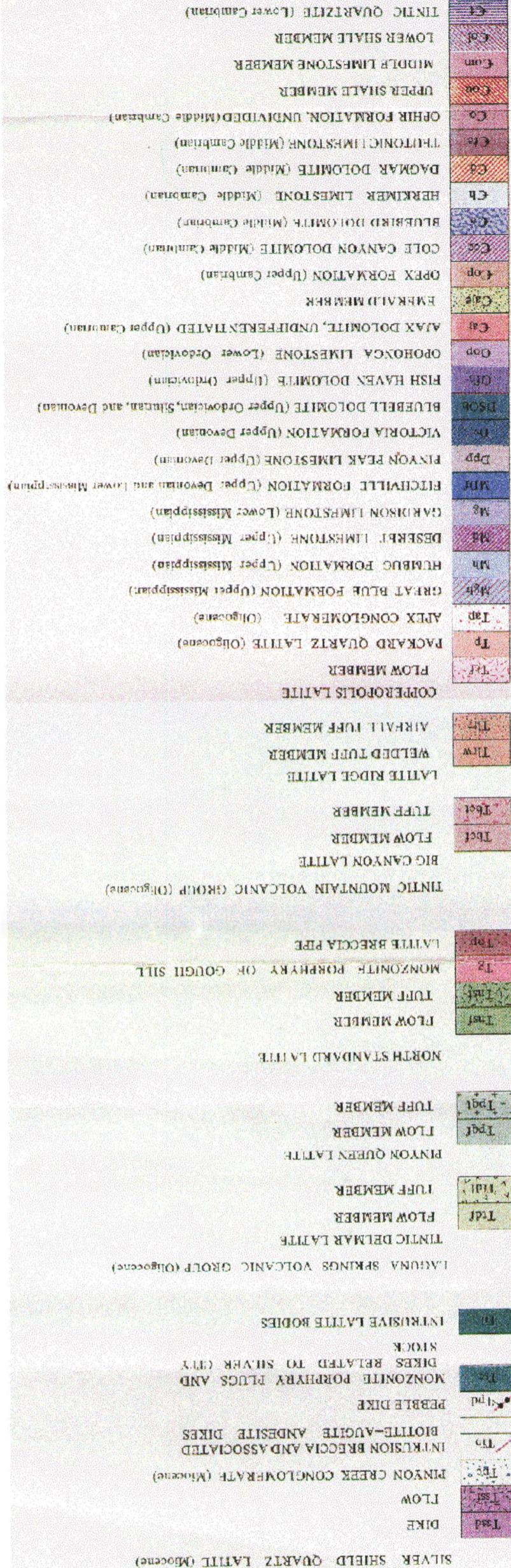
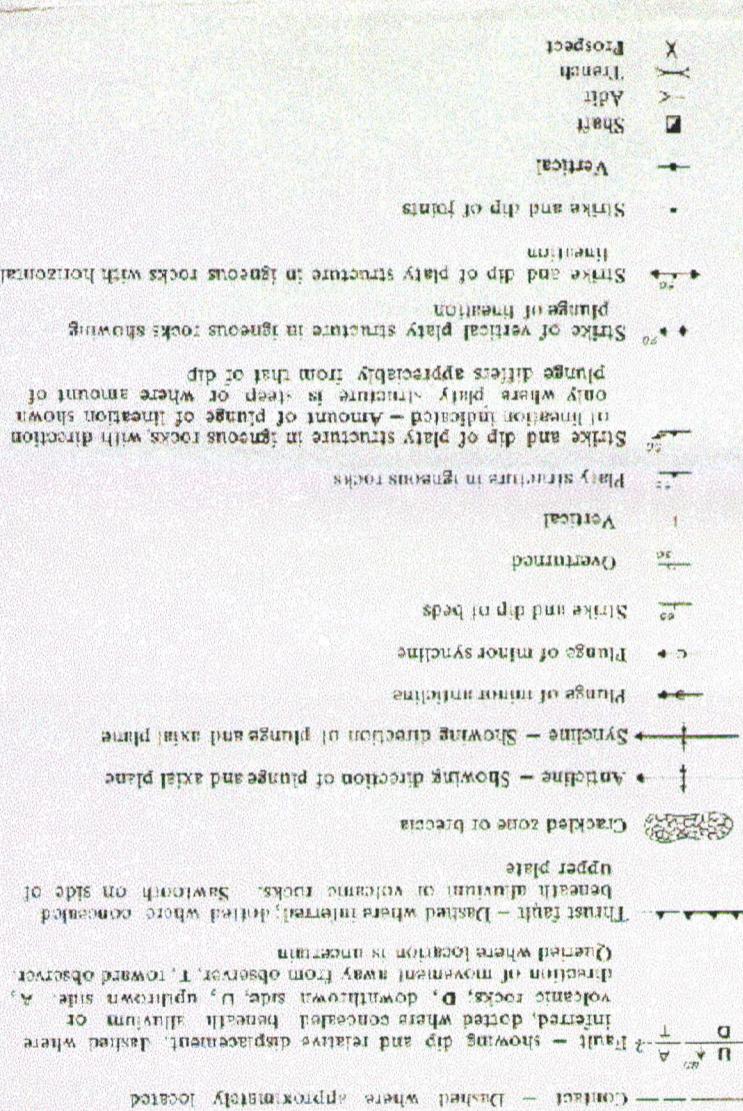
Exhibit G

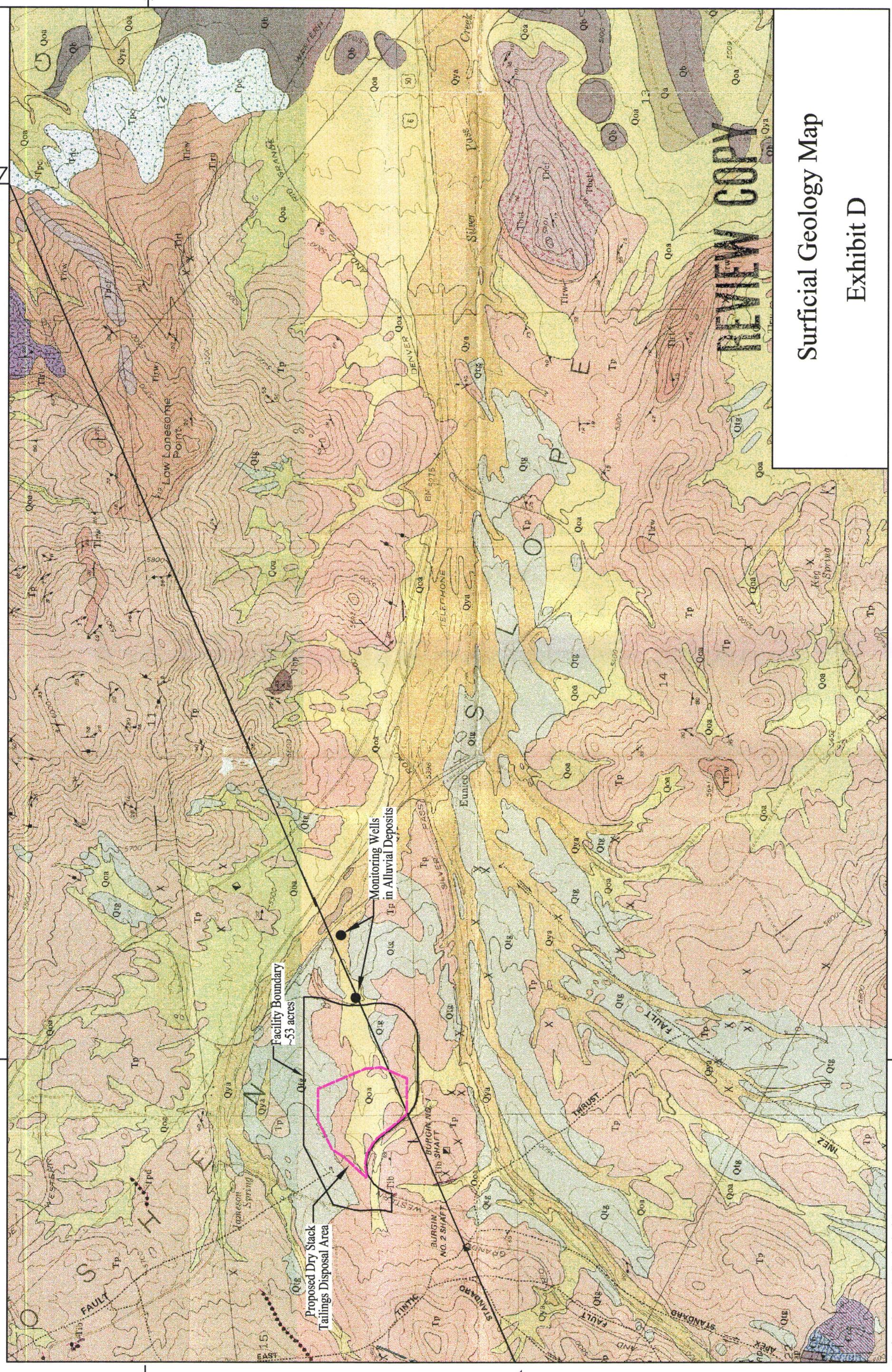
# Exhibit F

## Exhibits D and E

### Explanation for

From U.S. Geological Survey Professional, Paper 102A, Plate I, 1979





Surficial Geology Map

Exhibit D

See Exhibit E for Cross Section A-A' and Exhibit F for Explanation of Map Units and Symbols

Contour Interval 25 Feet

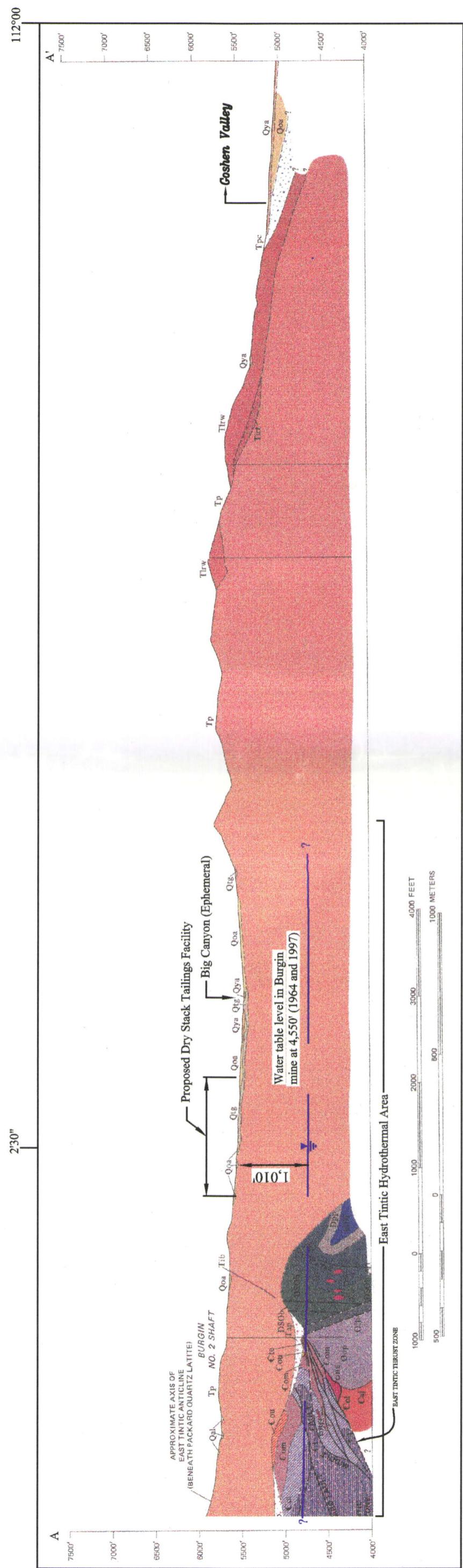
Scale 1"=1000'

Geology from U.S. Geological Survey  
Professional Paper 1024, Plate 1, 1979

**REVIEW COPY**

**Geologic Cross Section A-A'**

Exhibit E



Geologic section from U.S. Geological Survey Professional Paper 1024, Plate 2, 1979. Water table levels from U.S. Geological Survey Professional Paper 304-F, Plate 4, 1965, and from Burgin Apex mines in 1997.  
See Exhibit D for Cross Section Location and Exhibit F for Explanation of Geologic Units

M/049/009  
TINNIC UTM  
METHODS  
DR' STACK  
TRAILING  
PROPOSAL